

BACTERIOLOGICAL REVIEWS

VOLUME 38 • NUMBER 4 • DECEMBER 1974

EDITORIAL BOARD

R. G. E. MURRAY, *Editor* (1979)
University of Western Ontario,
London, Ont., Canada

R. N. DOETSCH, *Associate Editor* (1975)
University of Maryland
College Park, Md.

W. Lane Barksdale (1976)

Wolfgang K. Joklik (1974)

S. E. Mergenhagen (1976)

T. D. Brock (1976)

Loretta Leive (1976)

Howard V. Rickenberg (1976)

Franklin M. Harold (1976)

Howard D. McCurdy (1976)

Bruce A. D. Stocker (1975)

James A. Hoch (1975)

Ralph S. Wolfe (1974)

ROBERT A. DAY, *Managing Editor*, 1913 I St., N.W., Washington, D.C. 20006

EX OFFICIO

PHILIPP GERHARDT, *President* (1974–1975)
HELEN R. WHITELEY, *Vice-President* (1974–1975)

J. MEHSEN JOSEPH, *Secretary*
T. J. CARSKI, *Treasurer*

Correspondence relating to editorial matters should be addressed to the Editor, Prof. R. G. E. Murray, Department of Bacteriology, University of Western Ontario, London, 72, Ontario, Canada.

Bacteriological Reviews, a publication of the American Society for Microbiology, 1913 I St., N.W., Washington, D.C. 20006, accepts reviews and monographs dealing with all aspects of microbiology. *Reviews* is published quarterly (March, June, September, and December), one volume per year. The subscription price is \$16 per year in the US and Postal Union countries, \$17 in other countries. Single issues are \$5 (\$5.25 outside the US). Members of ASM may receive *Reviews* as part of their dues. Correspondence relating to subscriptions, reprints, defective copies, availability of back issues, or lost or late proofs should be directed to the ASM Publications Office, 1913 I St., N.W., Washington, D.C. 20006 (area 202 833-9416).

Correspondence from ASM members relating to membership dues, member subscriptions, changes of address, incorrect address, incorrect journals, etc., should be directed to the Executive Secretary, American Society for Microbiology, 1913 I St., N.W., Washington, D.C. 20006.

Second-class postage paid at Washington, D.C. 20006, and at additional mailing offices.

Made in the United States of America.

Copyright © 1974, American Society for Microbiology.

All Rights Reserved.

BACTERIOLOGICAL REVIEWS

INSTRUCTIONS TO AUTHORS

Bacteriological Reviews accepts reviews and monographs dealing with all aspects of microbiology. Authoritative and critical reviews of the current state of knowledge are preferred, although historical analyses will be accepted if the importance of the subject justifies this approach. Unevaluated compilations of the literature and annotated bibliographies do not fall within the scope of *Bacteriological Reviews*. Manuscripts of talks delivered at symposia and round tables are likewise unacceptable; however, their authors are encouraged to discuss with the Editor the possibility of using such material as the basis for preparation of a review, when publication in this form seems appropriate.

Monographs should embody the results of unusually extensive and well-rounded original investigations, the usefulness of which would be diminished by publication in the form of a series of separate papers. Past experience suggests that the monograph is particularly appropriate for the presentation of a definitive study on the biology of a microbial group.

Members of the Editorial Board will welcome any suggestions of topics and authors, either from prospective authors or from others. Prospective authors are advised to discuss with the Editor the suitability of their proposed contribution. The preparation of a synopsis or topical outline is desirable, since it often elicits constructive suggestions from editorial consultants. In addition, a one or two paragraph statement detailing the aim, scope, and relevance of the topic to be reviewed must be included with the outline. A review cannot, of course, be finally accepted until the finished product has been examined.

The editorial style of *Bacteriological Reviews* conforms to the *CBE Style Manual* (3rd ed., AIBS, 1972). References should be listed alphabetically according to the last name of the senior author, numbered serially, and cited by number in the text. For example: 136. Salton, M. R. J. 1952. Cell wall of *Micrococcus lysodeikticus* as the substrate of lysozyme. *Nature* 170:746-747. Names of journals are abbreviated according to *Bibliographic Guide for Editors & Authors* (American Chemical Society, 1974). A table of contents showing the major headings and subheadings of the text is usually desirable; consult recent issues of *Bacteriological Reviews* for style. All abbreviations used (except those for standard units of measurement) should be defined parenthetically at first use in the text. Biochemical abbreviations and nomenclature should essentially follow "Biochemical Nomenclature" in *Handbook of Biochemistry* (2nd ed., 1970, H. A. Sober, ed., The Chemical Rubber Co., Cleveland, p. A4-A24). In general, measurements should be expressed in terms of standard international metric units. Enzyme activity should be expressed in terms of international units (*Enzyme Nomenclature*, Elsevier Publishing Co., 1965), and the E. C. number should be given parenthetically at first use in the text. Genetics symbols introduced by the reviewer should essentially follow the recommendations of Demerec et al. (*Genetics* 54:61, 1966). As one of the requirements for description of a new species, we require deposition of the type culture in a recognized culture collection and designation of the accession number.

To expedite editorial review and preparation for the printers, the author should submit two copies of the manuscript, including illustrations. Original drawings should not be submitted; glossy prints are required. When appropriate, magnification should be indicated by a suitable scale on the photograph. Each figure should be numbered and should include the name of the author, either in the margin or on the back (marked lightly with a soft pencil). All material should be double-spaced, including quotations, tables, legends for text figures, and references. This is essential to allow space for corrections and printer's instructions. Each reference cited should be checked with the original publication; titles and both first and last pages should be included. References to unpublished data, abstracts, theses, and personal communications should be kept to a minimum; if unavoidable, these citations should be made in the text only, not in the list of references. Text footnotes are not permitted. (Subsidiary or extraneous material may be given, if necessary, within parentheses or brackets.) It is preferable to summarize supporting evidence whenever possible. When original data are presented, it is essential that the methods be fully described or that reference be made to previously published methods. It is the author's responsibility to obtain permission from the copyright owner to reproduce figures, tables, or quotations of more than 12 lines of text taken intact from previous publications, either his own or those of another author. Note that the journal or publisher (not the author) is the copyright owner; however, as a matter of courtesy the author's permission should be obtained as well. Each contributor will receive 500 gratis reprints of his contribution; additional reprints (in multiples of 100) may be purchased if desired. A table showing the cost of reprints, and an order form, will be sent with the proof. There are no page charges.

ACKNOWLEDGMENT

Sincere appreciation is expressed to the following scientists, who served as consultants to the Editorial Board and generously gave their time and talent for the review of manuscripts during 1974.

A. L. Demain	D. J. Kushner
M. Dworkin	E. R. Leadbetter
P. Gerhardt	E. H. Marth
D. Gottlieb	A. Morris
P. E. Hartman	D. Perlman
L. H. Hartwell	C. Robinow
H. F. Hasenclever	J. Schwarz
F. M. Hetrick	D. Silbert
P. von Hippel	H. Stern
F. L. Holmes	W. Stockenius
D. Kaiser	B. G. Young

AUTHOR INDEX

VOLUME 38

Bishop, C. T., 222
Blank, F., 222
Blumberg, Peter M., 291

Cheng, K.-J., 87
Chopan, Michael, 337
Collins, Frank M., 371
Costerton, J. W., 87

Docherty, John J., 337

Fox, Eugene N., 57

Grappel, S. F., 222

Hartwell, Leland H., 164
Houghton, M., 356

Ingram, J. M., 87

Jurand, Artur, 113

Lanyi, Janos K., 272
Lemke, Paul A., 29

McClung, L. S., 251
MacKenzie, J. S., 356
Meyer, K. F., 251

Nash, Claude H., 29

Preer, John R., Jr., 113
Preer, Louise B., 113

Schaechter, Moselio, 199
Slater, Martin, 199
Stebbing, Nowell, 1
Strominger, J. L. 291

SUBJECT INDEX

VOLUME 38

- Activated macrophages, 378
- Adjuvants
 - role in cell-mediated immunity, 392
- Bacterial cell division, 199
- Bacteriology
 - beginnings in California, 251
- Biosynthetic pathways, 1
- California
 - beginnings of microbiology, 251
- Cation specificity
 - salt-dependent proteins, 280
- Cell division, control of, 199
- Cell envelope of gram-negative bacteria, 87
 - cytoplasmic membrane, 87
 - external layers, 96
 - peptidoglycan-lipoprotein complex, 89
 - periplasmic zone, 92
- Cell-mediated immunity
 - induction with vaccines, 388
 - relationship of DTH, 387
 - role of adjuvants, 392
- Cellular immunity
 - mediators, 376
 - role of virulence factors, 373
 - to intracellular parasites, 372
- Cell wall synthesis
 - control, 326
 - effect of penicillin, 326
- Childhood cancer
 - influenza infections in pregnancy, 365
- Congenital malformations
 - circulatory, 360
 - cleft lip, 361
 - CNS, 357
 - relation to influenza during pregnancy, 356
- Control of cell division, 199
- Control of cell wall synthesis, 326
- Dermatophytes
 - immunochemistry, 231
 - immunoprophylaxis, 240
- Dermatophytosis
 - acquired resistance, 223
 - antibodies, 228
 - dermatophytid eruptions, 227
 - hypersensitivity, 225
 - nonspecific resistance, 230
- DTH
 - relationship to immunity, 387
- Electrostatic interactions
 - salt-dependent proteins, 273
- Endogenous control, 1
- Endosymbionts of *Paramecium aurelia*, 113
- Enzyme synthesis
 - control mechanisms, 1
 - pathways, 1
 - precursor pools, 1
- Eye
 - latent herpesvirus, 341
- Fungal viruses, 29
 - biochemistry, 32
 - discovery, 29
 - distribution, 29
 - replication, 37
 - structure, 32
 - transmission, 46
 - virulence, 39
- Genetic studies of cell division, 204
- Genital area
 - latent herpesvirus, 341
- Gram-negative bacteria
 - cell envelope, 87
 - enzymes of cell wall components, 100
 - function of cell wall enzymes, 101
 - synthesis of cell wall, 97
- Halophilic bacteria, extreme, 272
- Herpes simplex virus, latent, 337
- Herpesvirus, 337
- Hydrophobic effects
 - salt-dependent proteins, 281
- Immunity in dermatophytosis, 223
- Immunogenicity of cell components, 390
- Immunology of dermatophytes, 222
- Inactivated whole-cell vaccines, 389
- Influenza infections during pregnancy
 - association with congenital malformations, 356
 - subsequent neoplasms, 356
- Intracellular parasites
 - immunity to, 372
- Kappa endosymbionts
 - Paramecium aurelia*, 113
- Killing by penicillins, 324
- Lambda endosymbionts of paramecia, 119
- Latent herpes simplex virus, 337
- Latent herpesvirus and cancer, 345
- Latent virus location, 341
- Live virus vaccines
 - potential hazards, 368
- Living vaccines, 388
- M proteins, 57
 - antigenic properties, 58
 - biological properties, 58
 - chemical properties, 70
 - epidemiology, 67
 - immunological injury, 75
 - physical properties, 70

- streptococcal infection, 67
- type-specific antibody, 74
- vaccines, 77
- Mechanisms of latency
 - herpesvirus, 338
- Mononuclear phagocytes, 376
- Mu endosymbionts of paramecia, 119
- Neural tissue
 - herpesvirus infection, 342
- Non-neural tissue
 - herpesvirus infection, 342
- Oral cavity
 - recurrent herpesvirus infections, 341
- Paramecia endosymbionts
 - alpha, 125
 - delta, 122
 - gamma, 122
 - kappa and pi, 119
 - lambda and sigma, 119
 - mu, 119
 - nu, 122
 - tau, 122
- Paramecium aurelia* endosymbionts, 113
- Penicillin
 - interaction with bacterial cell, 291
- Penicillin-binding proteins, 296
- Penicillin-sensitive enzymes, 306
- Physiological aspects of cell division, 200
- Pi endosymbionts of paramecia, 119
- Precursor pools, 1
- Pregnancy
 - influenza infections during, 356
- Proteins
 - halophilic bacteria, 272
 - salt-dependent properties, 272
- Recurrent herpesvirus infections, 343
- Residue interactions
 - salt-dependent proteins, 278
- Saccharomyces cerevisiae*
 - cell cycle coordination, 183
 - cell division control, 186
 - cell division cycle mutants, 167
 - component processes of the cell cycle, 171
 - integration of growth with division, 190
 - synchronous cultures, 165
- Saccharomyces cerevisiae* cell cycle, 164
- Salt-dependency
 - proteins of halophiles, 272
- Streptococcal M proteins, 57
- Syngens of paramecia, 113
- T-lymphocytes, 381
- Transfer of resistance, 375
- Treatment of recurrent herpesvirus infections, 345
- Vaccines
 - induction of immunity, 388
 - live virus, 368
- Virulence factors
 - role in cellular immunity, 373
- Viruses, fungal, 29

U. S. POSTAL SERVICE STATEMENT OF OWNERSHIP, MANAGEMENT AND CIRCULATION (Act of August 12, 1970, Section 3685, Title 39, United States Code)		SEE INSTRUCTIONS ON PAGE 2 (REVERSE)
1. TITLE OF PUBLICATION BACTERIOLOGICAL REVIEWS		2. DATE OF FILING 30 September 1974
3. FREQUENCY OF ISSUE Quarterly		
4. LOCATION OF KNOWN OFFICE OF PUBLICATION (Street, city, county, state, ZIP code) (Not printers)		
1913 I Street, N.W., Washington, D.C. 20006		
5. LOCATION OF THE HEADQUARTERS OR GENERAL BUSINESS OFFICES OF THE PUBLISHERS (Not printers)		
1913 I Street, N.W., Washington, D.C. 20006		
6. NAMES AND ADDRESSES OF PUBLISHER, EDITOR, AND MANAGING EDITOR		
PUBLISHER (Name and address) American Society for Microbiology, 1913 I St., N.W., Washington, D.C.		
EDITOR (Name and address) R. G. E. Murray, Department of Bacteriology - University of Western Ontario, London 72, Ontario, Canada		
MANAGING EDITOR (Name and address) Robert A. Day, 4011 Rickover Road, Silver Spring, MD. 20902		
7. OWNER (If owned by a corporation, its name and address must be stated and also immediately thereunder the names and addresses of stockholders owning or holding 1 percent or more of total amount of stock. If not owned by a corporation, the names and addresses of the individual owners must be given. If owned by a partnership or other unincorporated firm, its name and address, as well as that of each individual must be given.)		
NAME ADDRESS American Society for Microbiology 1913 I Street, N.W., Washington, D.C.		
8. KNOWN BONDHOLDERS, MORTGAGEES, AND OTHER SECURITY HOLDERS OWNING OR HOLDING 1 PERCENT OR MORE OF TOTAL AMOUNT OF BONDS, MORTGAGES OR OTHER SECURITIES (If there are none, so state)		
NAME ADDRESS None		
9. FOR OPTIONAL COMPLETION BY PUBLISHERS MAILING AT THE REGULAR RATES (Section 132.151, Postal Service Manual)		
39 U. S. C. 3626 provides in pertinent part: "No person who would have been entitled to mail matter under former section 4309 of this title shall mail such matter at the rates provided under this subsection unless he files annually with the Postal Service a written request for permission to mail matter at such rates." In accordance with the provisions of this statute, I hereby request permission to mail the publication named in item 1 at the reduced postage rate provided authorized by 39 U. S. C. 3626. (Signature and title of editor, publisher, business manager, or owner)		
10. FOR COMPLETION BY NONPROFIT ORGANIZATIONS AUTHORIZED TO MAIL AT SPECIAL RATES (Section 132.122, Postal Manual) (Check one)		
The purpose, function, and nonprofit status of this organization and the exempt status for Federal income tax purposes <input checked="" type="checkbox"/> Have not changed during preceding 12 months <input type="checkbox"/> Have changed during preceding 12 months (If changed, publisher must submit explanation of change with this statement.)		
11. EXTENT AND NATURE OF CIRCULATION		
A. TOTAL NO. COPIES PRINTED (Not Press Run)	AVERAGE NO. COPIES EACH ISSUE DURING PRECEDING 12 MONTHS	ACTUAL NUMBER OF COPIES OF SINGLE ISSUE PUBLISHED NEAREST TO FILING DATE
12,818	12,818	12,894
B. PAID CIRCULATION		
1. SALES THROUGH DEALERS AND CARRIERS, STREET VENDORS AND COUNTER SALES		
NONE	NONE	NONE
2. MAIL SUBSCRIPTIONS		
11,167	11,167	11,504
C. TOTAL PAID CIRCULATION		
11,167	11,167	11,504
D. FREE DISTRIBUTION BY MAIL, CARRIER OR OTHER MEANS		
1. SAMPLES, COMPLIMENTARY, AND OTHER FREE COPIES		
11	11	11
2. COPIES DISTRIBUTED TO NEWS AGENTS, BUT NOT SOLD		
NONE	NONE	NONE
E. TOTAL DISTRIBUTION (Sum of C and D)		
11,178	11,178	11,515
F. OFFICE USE, LEFT OVER, UNACCOUNTED, SPOILED AFTER PRINTING		
1,640	1,640	1,379
G. TOTAL (Sum of E & F; should equal net press run shown in A)		
12,818	12,818	12,894
(Signature of editor, publisher, business manager, or owner) Robert A. Day		
I certify that the statements made by me above are correct and complete		

BACTERIOLOGICAL REVIEWS

VOLUME 38

BALTIMORE, MD.

1974

COPYRIGHT © 1975, AMERICAN SOCIETY FOR MICROBIOLOGY

CONTENTS

Precursor Pools and Endogenous Control of Enzyme Synthesis and Activity in Biosynthetic Pathways. NOWELL STEBBING.	1-28
Fungal Viruses. PAUL A. LEMKE AND CLAUDE H. NASH	29-56
M Proteins of Group A Streptococci. EUGENE N. FOX	57-86
Structure and Function of the Cell Envelope of Gram-Negative Bacteria. J. W. COSTERTON, J. M. INGRAM, AND K.-J. CHENG.	87-110
Erratum.	111

CONTENTS

Kappa and Other Endosymbionts in <i>Paramecium aurelia</i> . JOHN R. PREER, JR., LOUISE B. PREER, AND ARTUR JURAND.	113-163
<i>Saccharomyces cerevisiae</i> Cell Cycle. LELAND H. HARTWELL.	164-198
Control of Cell Division in Bacteria. MARTIN SLATER AND MOSELIO SCHAECHTER.	199-221
Immunology of Dermatophytes and Dermatophytosis. S. F. GRAPPEL, C. T. BISHOP, AND F. BLANK.	222-250

CONTENTS

Beginnings of Bacteriology in California. L. S. McCLUNG AND K. F. MEYER.	251-271
Salt-Dependent Properties of Proteins from Extremely Halophilic Bacteria. JANOS K. LANYI.	272-290
Interaction of Penicillin with the Bacterial Cell: Penicillin-Binding Proteins and Penicillin-Sensitive Enzymes. PETER M. BLUMBERG AND JACK L. STROMINGER.	291-335

CONTENTS

The Latent Herpes Simplex Virus. JOHN J. DOCHERTY AND MICHAEL CHOPAN.	337-355
Influenza Infections During Pregnancy: Association with Congenital Malformations and with Subsequent Neoplasms in Children, and Potential Hazards of Live Virus Vaccines. J. S. MACKENZIE AND M. HOUGHTON.	356-370
Vaccines and Cell-Mediated Immunity. FRANK M. COLLINS.	371-402

INDEX TO DATE OF ISSUE

Month	Date of Issue	Pages
March	27 March 1974	1-112
June	25 June 1974	113-250
September	30 September 1974	251-335
December	3 January 1975	337-402